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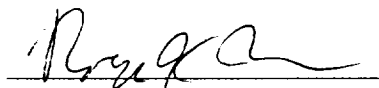
Annual Grant Progress Report
and Continuation Proposal
to the
National Aeronautics and Space Administration
for
**Calibration of Magnetically Induced Solar Velocity Signals
for the GOLF Investigation using Mt. Wilson 150-foot Tower**

2-742

Submitted by

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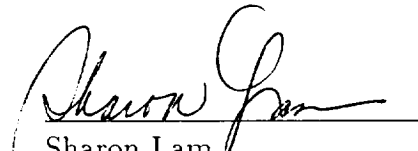
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Budget Period: February 1, 1996 to January 31, 1997
Duration: Twelve months
Estimated Cost: \$76,000

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MAR 12 1996

**1992 PROGRESS REPORT FOR:
CALIBRATION OF MAGNETICALLY INDUCED SOLAR VELOCITY SIGNALS
FOR THE GOLF INVESTIGATION USING MT. WILSON 150-FOOT TOWER**

Roger K. Ulrich, P.I.

Progress during 1995

The effort during the 1995 was directed toward the implementation of the 24-channel system which is now nearly installed. This system will permit us to make simultaneous line profile maps of the solar surface in the MDI $\lambda 6768$ line and the Na D lines. The intercomparison of the GOLF and MDI data requires that we have a knowledge and understanding of the systematic differences between these two lines which are formed at different altitudes in the solar atmosphere. This system will have 5 major parts:

- 1) a new grating providing 7th, 8th and 9th order access to $\lambda 6768$, $\lambda 5896$ and $\lambda 5250$ respectively. This grating is now in regular use and gives us a cleaner spectral sampling than the previous grating which produced an asymmetric profile with a HeNe laser and the Na cell absorption.
- 2) Three new fiber-optic reformatters to sample the solar spectrum at up to 20-points each (only 10 of which will be used for each reformatter during typical observations). Two will be used for the Na and Ni lines while the third is required for the synoptic $\lambda 5250$ line due to the geometry change from the new grating. These fiber-optic assemblies are on order from Schott Fiber-Optics and are scheduled for delivery by the end of February 1996.
- 3) two new 12-channel exit slit stages with PMT's and amplifier electronics (two channels for each stage will be dedicated to the $\lambda 5250$ synoptic program). These are now finished and undergoing final checkout.
- 4) A new digitizing/computer interface system to connect to the existing PDP-11 based data acquisition system. This is in regular operation and has functioned without problem for the past 18 months.
- 5) New acquisition and reduction software to permit the analysis of the 24-channels of data. This is in debugging.

At the end of 1995 a new project was begun and completed: the measurement of the Na D₂ profile. This line is included in the GOLF system but due to difficulty with telluric H₂O absorption, has not previously been available from ground-based observatories. The very high precision of the Mt. Wilson line profile system has permitted us to obtain profiles at variable H₂O column depths and correct for this contamination. A strong telluric feature just blueward of the spectral passband has been used to select days with low column depth for observation. Adequate profiles have now been obtained at center-to-limb angles of 0°, 45°, 60° and 75°. These profiles have been combined with profiles of D₁ previously obtained at Mt. Wilson to permit a simulation of the GOLF signal. The instrument model based on Mt. Wilson data will be used to assist in the selection of the operating temperature for the GOLF sodium cell. These observations were presented to the Golf Science Committee at Orsay on Jan. 4, 1996.

Tasks for 1995

1. We use early MDI data to develop pipeline procedures which can convert the MDI spot and plage images into correction velocities for the GOLF data. This task will require a quantitative modelling of the combined effects of MDI filter defects and active region line profile modifications. These two effects have been modelled separately but not in combination. A meeting was held at UCLA on Nov. 10. This meeting was attended by the following people:

R. Ulrich, UCLA
L. Bertello, UCLA
J. Pap, UCLA, JPL
C. Henney, UCLA
D. Parker, UCLA
S. Evans, UCLA
T. Sheiber, UCLA, Mt. Wilson
T. Hoeksema, Stanford
R. Bogart, Stanford

L. Sa, Stanford
I. Zayer, Lockheed-Martin
J. Kuhn, NSO, Sac. Peak, U. Mich.
H. Lin, NSO, Sac. Peak
G. Severino, Obs. Capodimonte, Napoli
H. Dzitko, Univ. Paris XI, Saclay
R. Garcia, IAC, Tenerife
G. Chapman, CSUN

Calibration procedures for MDI and GOLF were discussed along with the planned methods of flat-fielding the MDI images.

2. We will begin obtaining line profile maps of the solar surface.
3. We will use the GOLF data to adjust the instrument model based on the Mt. Wilson line profiles. This model will be used to account for the dependence of the stem temperature sensitivity on the sun-spacecraft velocity. This complication was found as a result of the instrument model. An effort will be made to obtain temperature sensitivity measurements at two different sun-spacecraft velocities in order to verify this aspect of the instrument model.

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